



HONOLULU

LA JOLLA

TIBURON

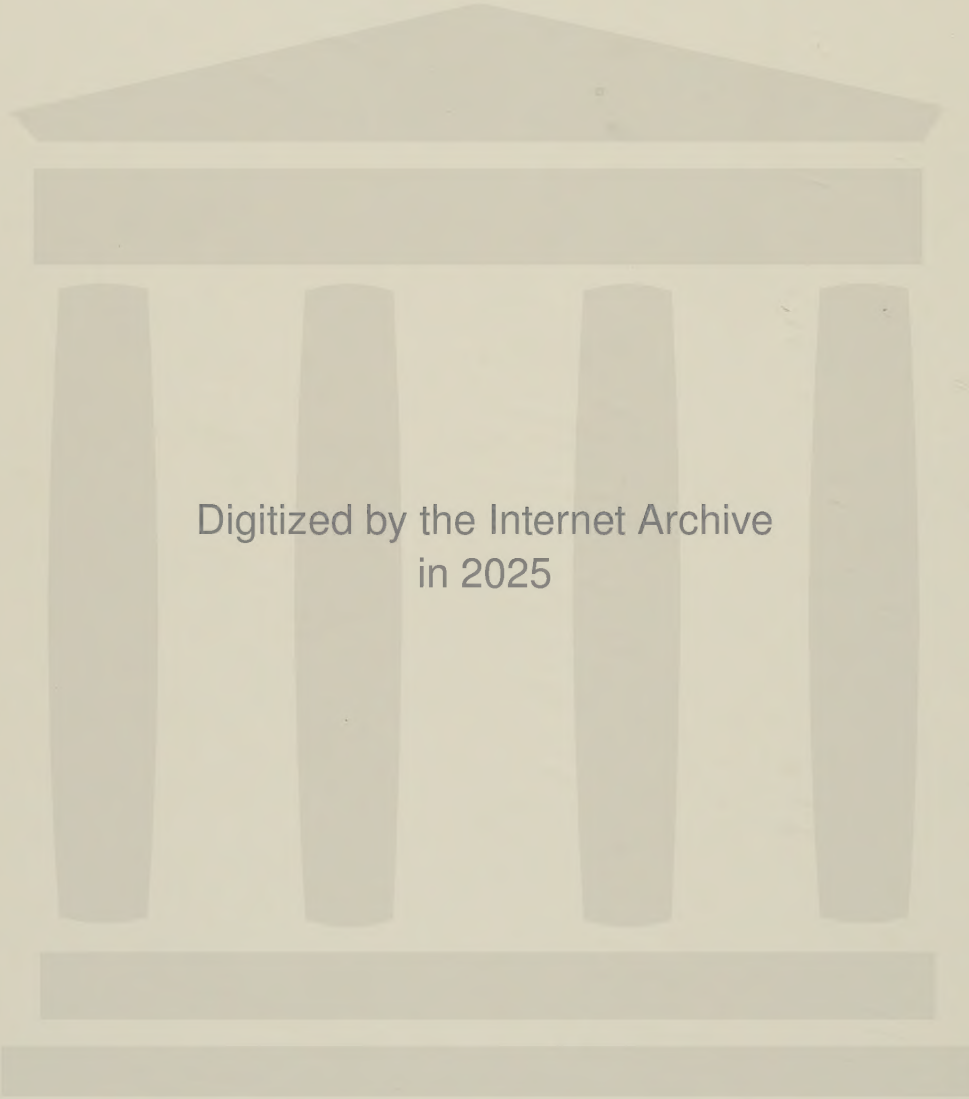
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SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - DECEMBER 1975

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HONOLULU LABORATORY
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MONTHLY REPORT - DECEMBER 1975

STATUS OF PUBLICATIONS

Published

Laurs, R. Michael, Charles Hooker, Larry Hreha and Richard Lincoln. 1975. A uniform U.S. West Coast logbook for albacore, Thunnus alalunga (Bonnaterre), and coastwide albacore fishery data system. Mar. Fish. Rev. 37(11): 14-21.

Stauffer, Gary, Alec MacCall and Bruce Whalen. 1975. Fish prices: Historical trends in southern California commercial fisheries. Mar. Fish. Rev. 37(11): 22-30.

Otsu, Tamio. 1975. Japan's fisheries. 1975. U.S. Nat'l. Mar. Fish. Serv., Mar. Fish. Rev. 37(11):1-13. (MFR Paper 1165.) [Part of this report appeared in the National Marine Fisheries Service Tuna Newsletter 31, April 1975.]

Japan's fisheries in 1975 are discussed by the author, who spent 2 weeks in Japan early in 1975 conferring with fishery biologists and members of the Japanese fishing industry after attending the Japanese Tuna Research Conference, Shimizu City, Japan. He reports on Japan's tuna industry, 1975; purse seine trials; southern water skipjack tuna fishery; skipjack tuna fishery survey in Micronesia; bluefin tuna rearing; and Antarctic krill, among other topics.

Uchida, Richard N. 1975. Recent development in fisheries for skipjack tuna, Katsuwonus pelamis, in the central and western Pacific and Indian Oceans. In Studies of skipjack in the Pacific, p. 1-57. FAO Fish. Tech. Pap. 144.

This report does not constitute publication and is for information only.

There have been recent developments in the fisheries for skipjack tuna, Katsuwonus pelamis, in the central and western Pacific and Indian Oceans. This paper presents information on skipjack tuna resources country by country. Data were collected in existing commercial fisheries, exploratory fishing, and newly established commercial fishing operations. Because of the importance of the availability of bait for pole-and-line fishing in many of the developing countries, data on bait species, catch localities, and catch rates are also presented.

Yoshida, Howard O. 1975. The American Samoa longline fishery, 1966-71. Fish. Bull., U.S. 73:747-765.

The longline fishery based at American Samoa is discussed primarily as it relates to the albacore, Thunnus alalunga, and to a smaller extent to the yellowfin tuna T. albacares. This discussion covers the period from 1966 to 1971. During this period the landings of albacore fluctuated between 17,722 and 28,310 metric tons. Although no downward trend was evident in the relation between total landings and total effort, the relation between catch per unit of effort and effort showed a definite downward trend. Generally, the fishing effort was confined to the north of lat. 20° S in the first and fourth quarters of the year. In the second and third quarters large amounts of effort were also expended south of lat. 20° S. The length-frequency distribution of albacore showed that albacore sizes were stratified by latitude.

Approved by Center Director

Moser, H. Geoffrey, Elbert H. Ahlstrom and Elaine M. Sandknop. "Guide to the identification of scorpionfish larvae (family Scorpaenidae) in the eastern Pacific with comparative notes on species of Sebastes and Helicolenus from other oceans." For publication in the Fish. Bull., U.S.

Graves, John. "A method for measuring the spacing and density of pelagic fish schools at sea." For publication in the Fish. Bull., U.S.

Ahlstrom, Elbert H., H. Geoffrey Moser and Michael J. O'Toole. "Development and distribution of larvae and early juveniles of the commercial lanternfish, Lampanyctodes hectoris Günther, off the west coast of southern Africa with a discussion of phylogenetic relationships of the genus." For publication in the Proc. S. Calif. Acad. Sci., S.P.

Korn, Sid, Nina Hirsch and Jeannette Struhsaker. "The uptake, distribution and depuration of ¹⁴C benzene in northern anchovy (Engraulis mordax) and striped bass (Morone saxatilis)." For publication in the J. Fish. Res. Bd. Canada.

Korn, Sid, Jeannette W. Struhsaker and Pete Benville. "The effects of benzene on the growth, fat content, and caloric content of striped bass (Morone saxatilis)." For publication in the Fish. Bull., U.S.

HONOLULU LABORATORY

TUNA ASSESSMENT AND DEVELOPMENT INVESTIGATIONS

Status of North Pacific Albacore Stock Assessed
at Honolulu Laboratory Workshop

A workshop on the population dynamics of North Pacific albacore was held at the Honolulu Laboratory on December 10-12. The workshop was conducted as part of an informal agreement between the Southwest Fisheries Center and the Far Seas Fisheries Research Laboratory, Shimizu, Japan, to promote and accelerate joint research on the North Pacific albacore stock. Objectives of the workshop were 1) to produce a first-cut assessment of the status of the stock, with respect to standard equilibrium yield and yield-per-recruit criteria, 2) to identify weaknesses in the preliminary assessments, and 3) to recommend specific areas for further cooperative study. Participants included scientists from the Honolulu and La Jolla Laboratories of the Southwest Fisheries Center, Mr. Toshio Shiohama of the Far Seas Fisheries Research Laboratory, and representatives of the California Department of Fish and Game, the Oregon Department of Fish and Wildlife, the Washington Department of Fisheries, and the Pacific Marine Fisheries Commission. Dr. Jerry Wetherall of the Honolulu Laboratory acted as chairman, and Drs. Robert Skillman of the Honolulu Laboratory and Gary Sakagawa of the La Jolla Laboratory were rapporteurs. Mr. Tamio Otsu served as Mr. Shiohama's interpreter during the meetings.

The workshop focused on a review of preliminary assessment studies recently completed by Dr. Wetherall and Ms. Marian Yong of the Honolulu Laboratory, and by Mr. Shiohama and Dr. Shou Morita of Shimizu. The tentative nature of the findings was explicitly emphasized. It was agreed that a more definitive appraisal must await further careful study.

Dr. Wetherall reported the results of a cohort analysis, a yield-per-recruit assessment, and an examination of equilibrium yields based on different stock-recruitment assumptions. These analyses, which integrated catch statistics from the major Japanese and United States fisheries over a 21-year period, indicated that the North Pacific albacore stock was underfished in a yield-per-recruit sense in the mid-1960's, and that yields in the last few years have been approaching the maximum sustainable average yield estimated at 110,000 to 125,000 MT (metric tons). The cohort analysis indicated perhaps a threefold to fivefold variation in the strength of year classes, and an increase in spawning stock in the late 1960's. The latter result is substantiated by a rise in catch rates of mature albacore in the Hawaiian and Japanese longline fisheries in the last several years.

Mr. Shiohama presented results of a preliminary production model assessment of the stock, and discussed recent developments in the Japanese pole-and-line fishery and trends in home-consumption of albacore.

His exploratory production model results were, broadly speaking, consistent with the findings of Wetherall and Yong, i.e., a potential yield in the neighborhood of 125,000 MT annually.

The workshop participants agreed that further cooperative research and additional workshops were highly desirable, and outlined a specific set of objectives for the next phase of investigation by NMFS and FSRL. These include an expansion of catch statistics to include the relatively minor harvests of other countries and types of gear, and a more extensive evaluation of production models. In addition, the participants recommended a study of alternative procedures for constructing year-class catch histories, including growth models, and their effects on conclusions of the cohort analysis. Also suggested was a critical study of recent tag returns with the purpose of estimating exploitation rates. Another area needing special attention is the early assessment of year-class strength and reproductive potential. This will require the development of recruitment indices and indices of stock fecundity.

Finally, it was agreed that the continued cooperation between California, Oregon, and Washington in collecting, classifying, coding and processing catch, effort and size-composition statistics is fundamental to the NMFS stock assessment capability and that every possible means should be taken to strengthen and support inter-state albacore programs.

FAO Ad Hoc Committee Reviews Status of Stocks of Small Tunas at Honolulu Laboratory Workshop

A successful workshop was held from December 15 to 18, 1975 at the Honolulu Laboratory of the Southwest Fisheries Center to review the biology and status of the stocks of small tunas. The workshop was organized by Laboratory Director Shomura, who recently accepted the chairmanship of the FAO Working Party on Small Tunas and Related Species, and was conducted by a specially constituted FAO Ad Hoc Committee. (For a list of the workshop participants see Meetings and Travel section.)

The Ad Hoc Committee considered two groups of tunas and related species during its several sessions. The first group, which was considered in greater detail, included the following species: Katsuwonus pelamis; Auxis spp.; Sarda spp.; Euthynnus spp.; Thunnus tonggol; and Thunnus atlanticus. The second group included Scomberomorus; Rastrelliger; Gymnosarda; Allothunnus; Cybiosarda; Gasterochisma; and Grammatorcynus. The discussions on the above listed tunas and related species revolved around the following topics: taxonomy, statistics, current utilization, future utilization, research requirements, and management problems.

Mr. Shomura acted as chairman during all the deliberations of the Ad Hoc Committee. The following draft status reports were prepared for the workshop:

"The biology, ecology, and resource of the skipjack tuna, Katsuwonus pelamis" by Walter M. Matsumoto and Robert A. Skillman. SWFC Admin. Rep. 12H, 1975.

"Status of knowledge on the biology and resources of the frigate mackerel, genus Auxis" by Richard N. Uchida. SWFC Admin. Rep. 13H, 1975.

"The biology and resources of the species of Euthynnus" by Howard O. Yoshida. SWFC Admin. Rep. 14H, 1975.

"The biology and resources of the bonitos, genus Sarda" by Howard O. Yoshida. SWFC Admin. Rep. 15H, 1975.

The Honolulu Laboratory staff members, Mr. Walter Matsumoto, Dr. Robert Skillman, Mr. Richard Uchida, and Mr. Howard Yoshida acted as rapporteurs during the meetings.

Report of Townsend Cromwell's Recent Cruise
to Northwest Hawaiian Islands Provides First
Results of Insular Resource Sampling

A detailed report of the Townsend Cromwell's 37-day cruise to the Northwest Hawaiian Islands has been completed. This cruise, which ended November 26, was the first of a series planned to assess the resources of that region. Sampling effort consisted of 26 fish trawl stations, 9 shrimp trawl stations, 96 fish and lobster trap stations, 14 handline stations, 15 surface plankton tows, 2 benthic longline sets, and 2 shrimp trap sets in depths ranging from 14 to 430 fathoms. Additionally, about 400 hook-hours of trolling were conducted near banks and between sampling areas.

Fish trawling was conducted with a high-opening "Norwegian" trawl (66 ft headrope, 83 ft footrope) in depths of 16 to 215 fathoms. Most stations were in depths of 16 to 34 fathoms at Middle Bank, Nihoa Bank, Necker Bank, and St. Rogatien Bank. All sets were made "blind" and represent the first trawl samples obtained from the banks of the Northwest Hawaiian Islands. Frequent tears in the trawl wings due to snags on solitary corals and low ledges were experienced. This was probably attributable to inadequate footrope protection, and problems of this sort should be alleviated on future cruises. Catch rates varied from 18 to 1,129 lb/h with mean standing biomass estimates varying from 1,582 to 4,680 kg/km² at three areas. Catches were usually dominated by zooplanktivorous and herbivorous species. The small serranid Caesioperca thompsoni and the introduced lutjanid Lutjanus kasmira were the most abundant species taken at Middle Bank. Near Nihoa and Necker Islands three species of Naso (Acanthuridae) contributed greatly to the catches. Trawling north of Necker Island in depths of 170 to 215 fathoms produced catches at rates of less than 31 lb/h. Of interest, however, was the capture of a single specimen in 210 fathoms of Decapterus russelli, representing the first Hawaiian record of this species. This commercially important genus is now represented by three species in the Hawaiian Islands.

Ninety-six fish and lobster trap stations were occupied in the 16 to 65 fathom depth range. Fish catches were variable and generally small. Fair catches of opakapaka, Pristipomoides microlepis, were made on four

occasions with the large traps at the shelf edge north of Necker Island in depths of 24 to 31 fathoms. These catches ranged from 10 to 17 lbs/set ($\bar{x}$ = 11.9 lbs). One trap near Kure Atoll (26 fathoms) produced 40.5 lbs of Caranx cheilio. Two traps (of 12) in 15 fathoms near Lisianski Island produced 35 and 105 lbs of Carangoides ajax.

Lobster, Panulirus marginatus Randall, catches were also variable. Best catches were made north of Necker Island. Here, 17 traps set in 16 to 31 fathoms produced 160 lobsters (estimated mean weight 1.4 lbs). Best catches were made near the edge of the bank in 24 to 31 fathoms. Fair numbers of lobsters were taken in 24 to 26 fathoms NNW of Nihoa Island. Here, 11 traps yielded 41 lobsters with estimated mean weights of 2.0 lbs. Sets near Pearl and Hermes Reef, Kure Atoll, Lisianski Island, Laysan Island, and Gardner Pinnacle produced only a few lobsters. Of interest was the occurrence of Kona crabs, Ranina serrata, in traps set in 25 to 30 fathoms off Pearl and Hermes Reef and Kure Atoll. Three traps at Kure produced 10 to 60 lbs. each ($\bar{x}$ = 30.7 lbs per trap).

A total of 14 handline stations in depths of 14 to 55 fathoms was occupied at various localities during the cruise. Catches were dominated by C. ajax, C. cheilio, P. microlepis, Serriola dummerilii, and Epinephalus quernus. Best catches were near Gardner Pinnacle where 11 C. ajax weighing 400 lbs were taken and Laysan Island where 33 C. ajax weighing a total of 645 lbs were captured during 3 hours of fishing with five handlines.

Shrimp traps were set overnight in depths of 260 and 300 fathoms on two occasions. One set of six traps off Necker Island produced 36.5 lbs of H. laevigatus (mean weight of 8 to 9 individuals per pound, heads on). A set of four traps off Nihoa Island yielded 24.2 lbs of H. laevigatus and 4.3 lbs of H. ensifer.

Trolling produced a total of five yellowfin tuna, Thunnus albacares, three kawakawa, Euthynnus affinis, three mahimahi, Coryphaena hippurus, one skipjack tuna, Katsuwonus pelamis, and one wahoo, Acanthocybium solandri.

As reported last month, a short field trip was conducted to Pearl and Hermes Reef to acquaint nine State and Federal officials with the Hawaiian Islands National Wildlife Refuge.

Worst Skipjack Tuna Catch on Record in Hawaiian Fishery in 1975

The December 1975 catch of skipjack tuna in the Hawaiian fishery reached an estimated 66.7 MT, 29.4 MT lower than the catch in December 1974 and 55.1 MT below the December average from 1948 to 1974. This brought to a close the year with the smallest skipjack tuna catch since the recording of catches began, a catch estimated at 2,229.4 MT. This is 1,143.7 MT below last year's catch for the same period and 2,186.6 MT below the long-term average.

* * * * *

The lengths of 975 albacore from 21 fishing vessels in Pago Pago Harbor were recorded during the period November 22 to December 19 by Government of American Samoa employee Pulou Niuatoa. He also collected 16 sets of catch and effort data. Utilizing data from five vessels, Computer Aid Lucille Tsukano determined an average albacore size of 94.4 cm and an albacore catch per 100 hooks of 1.49.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

NMFS Hosts 1975 CalCOFI Conference

Chaired by Dr. Ruben Lasker, Chief of the Coastal Fisheries Resources Division at the La Jolla Laboratory, the annual California Cooperative Oceanic Fisheries Investigation Conference was held at the University of California, San Diego, December 9-11. All of the participants in CalCOFI were represented as well as three Mexican institutions - Instituto Nacional de Pesca; Ciencias Marinas; and Centro de Investigacion Scientifica y Educacion Superior de Ensenada (CISESE).

A symposium, arranged by Dr. Gary Stauffer, NMFS and Mr. Alec MacCall of CF&G on "The anchovy management challenge" was the central feature of the meeting. Mr. Robert Kaneen, head of the California Department of Fish and Game Laboratory in Long Beach, gave the opening talk, "California's view of anchovy management;" Mr. Daniel Lluch B. of the Instituto Nacional de Pesca, Mexico, discussed, "The Mexican view of the anchovy fishery;" Dr. William Clark of FAO, Rome, covered, "The lessons of the Peruvian anchoveta fishery;" and Mr. David L. Cram of the Sea Fisheries Institute, South Africa, spoke on "Research and management in the southeast Atlantic pelagic fisheries."

Commercial and recreational fishery representatives were in the audience and participated in the discussion following the symposium. Of greatest interest to the listeners, judging from the question and answer period, is the augmentation of the Mexican anchovy purse seine fleet with 30 new boats, bringing the fleet to 60 purse seiners, and the rapid construction of fish reduction plants in Baja California. Mexico's stated intention is to fish the anchovy resource at approximately 500,000 tons per year.

During the following 2 days of the meeting, contributed papers were presented, with La Jolla Laboratory scientists well represented, as follows:

- Dr. John R. Hunter and Carol Sanchez: "Daily changes of swimbladder inflation of the larvae of the northern anchovy, Engraulis mordax."
- Dr. Paul E. Smith: "Catch rates of northern anchovy larvae: day, night, and twilight."
- Mr. Ronald J. Lynn and Joseph L. Reid: "On the year-to-year differences and the characteristics of the California Current."
- Drs. Elbert H. Ahlstrom and H. Geoffrey Moser: "Some observations on flatfish larvae taken on CalCOFI cruises."
- Dr. Angeles Alvarino: "Predation in the plankton realm, and fisheries."
- Dr. H. Geoffrey Moser, Dr. E. Ahlstrom and Ms. Elaine M. Sandknop: "Research on larvae of Sebastes and related genera at the Southwest Fisheries Center, La Jolla Laboratory."
- Dr. Paul Smith and Mr. John E. Graves: "Observations of schools of northern anchovy and calculations of some consequences of the schooling habit."
- Mr. Larry Eber: "A retrieval and display system for the CalCOFI oceanographic data files."
- Mr. Alfredo Cota and Dr. Paul Smith: "Some quantitative characteristics of acoustical fish school targets as affected by school size, compaction and range dependence."
- Dr. Reuben Lasker: "Is upwelling good for first-feeding anchovy larvae?"
- Dr. Edward Scura: "The accumulation of chlorinated hydrocarbons in a laboratory simulation of a marine food chain."

Following the CalCOFI Conference, Dr. Lasker chaired a meeting of the INP/CalCOFI Stock Assessment Committee. This Committee is made up of working scientists from Mexico, FAO, CF&G and the NMFS. Under the organizational arrangement with INP, the Stock Assessment Committee is a subunit of the INP/CalCOFI Committee, which recommends courses of action for stock assessment and conservation of anchovy to their respective institutions. Some important recommendations made to the Stock Assessment Committee were: increased activity in acoustics; aging and sampling of anchovies; a definition of catch per unit of effort; and an intensive examination of existing logbooks. In addition, a data management system for anchovy stock assessment was recommended with initial action to be taken by a new subcommittee which was established on Data Management Systems.

MARMAP Acoustics Workshop Held at Center

Early in December, the Coastal Fisheries Resources Division was host to a MARMAP (Marine Resources Monitoring, Assessment and Prediction)

Survey 3 (pelagic fish) acoustics workshop. The meeting was planned and organized by Mr. A. M. Vrooman, MARMAP Survey 3 Coordinator from Washington, D. C. (and formerly on the staff of the La Jolla Laboratory), and attended by representatives of acoustic fishery research groups from fishery research Centers in the Northwest, Southeast, and Northeast. Dr. Paul Smith, Fishery Biologist at the La Jolla Laboratory, presented an up-to-date account of the SWFC work in acoustical surveys. This included the documented accomplishments in the estimation of numbers of schools per unit area, the effect of sample size on the precision of this estimate, the size distribution of fish schools, and the regional estimation of fish school biomass. Dr. Smith also reported progress in the calibration of equipment on ships from the California Department of Fish and Game (Alaska) and from the Instituto Nacional de Pesca (Humboldt) so that these ships may proceed to make rapid comparable estimates of the schooled fish off the West Coast. He also reported on a theoretical study of the acoustic monitoring of the growth, survival, and recruitment of year classes of northern anchovy.

Based on this background of work and accomplishment, Dr. Smith, with the assistance of his colleagues in the Coastal Fisheries Resources Division, California Department of Fish and Game, Instituto Nacional de Pesca and Dr. Van Holliday of TRACOR, prepared a Task Development Plan for MARMAP Survey 3 to institute and coordinate sonar mapping surveys, to provide timely information on the status of northern anchovy stocks during the period of projected rapid increase in the Mexican fishery. Since the increased fishery will be likely to become more dependent on recruitment, some research money was planned to assist in the analysis of recruitment rates by acoustic means, primarily surveys of resonant frequency accompanied by direct samples of the anchovy stock.

ALBACORE FISHERIES PROGRAM

Differences Noted When Albacore Fishing Gear Comparisons Made

Dr. R. Michael Laurs, Leader of the Albacore Fisheries Program at the La Jolla Laboratory reports that analysis continued in December of albacore tagging data obtained during the cooperative NMFS-AFRF albacore tagging program. A comparison of the fishing gear type used to catch albacore for tagging and type of gear used when tagged fish were recovered yielded interesting results in that there are marked differences between the types of fishing gear that have been used to catch albacore for tagging and types of gear used to catch fish for tagging and to recover tagged fish is given in Table 1. Eighty six percent of the tagged fish that have been recovered were tagged by jigboats and 10.9% by baitboats; however, jigboats have made only 6.7% of the recoveries of tagged fish while baitboats have made 68.9% of the recoveries.

Table 1. Gear used to catch albacore for tagging and gear used to recover tagged albacore.

Gear type	Tagging		Recovery	
	Number	Percent	Number	Percent
Jig	362	86.0	28	6.7
Bait	46	10.9	290	68.9
Sports	5	1.2	34	8.1
Seiner	0	0	11	2.6
Longliner	0	0	6	1.4
Unknown	8	1.9	52	12.4
Total	421	100.0	421	100.0

On the average, about 75% of the total albacore catch made in a season is caught by jigboats and 25% by baitboats. If tagged fish are randomly distributed in the fishery and exhibit no bias as to the type of gear they strike, one would expect about three times more tag recoveries by jigboats than by baitboats. Instead, baitboats recover nearly 10 times as many tagged fish as jigboats.

The observed results indicate an interaction between the behavior of tagged fish and vulnerability to gear type; however, an explanation is not readily apparent and will require further examination.

Ron Dotson, Biological Technician, completed a manuscript entitled "Minimum swimming speed of albacore, Thunnus alalunga."

Measurements of density and pectoral lifting area of albacore (Thunnus alalunga) were made and compared to those previously described for yellowfin tuna (Thunnus albacares), bigeye tuna (Thunnus obesus), and skipjack tuna (Katsuwonus pelamis). Albacore were found to have densities within the range found in yellowfin tuna of similar size. The pectoral lifting area of albacore was always greater than skipjack tuna, and similar to yellowfin tuna and bigeye tuna. Minimum speed necessary for hydrostatic equilibrium for albacore was calculated using a model described by Magnuson (1970). Comparisons of minimum speed for each species were made at 50 and 80 cm fork lengths. Albacore minimum speeds were found to be similar to those of yellowfin and bigeye tuna and less than that for skipjack. Density variations found in albacore were attributed to fat content and gas bladder volume and were found to affect estimates of minimum speed. The manuscript is now being reviewed before submission to the Fishery Bulletin, U.S.

RECREATIONAL FISHERIES PROGRAM

Mr. James Zweifel, Mathematician at the La Jolla Laboratory is studying analysis techniques of what may generally be called catch and

effort data from pelagic populations as part of a re-examination of the CalCOFI egg and larval surveys. Although the published literature and public and private data files are replete with catch and effort information, no consensus of its value exists. This is so primarily for two reasons: 1) each population and sampling technique is unique, being the result of a myriad of biological, environmental, logistic, economic, and human factors, and 2) many of the classical statistical and data analysis techniques often have little if any relevance to the real world of dynamic prey-predator relationships, whether human or otherwise. Such problems relate to egg and larval surveys as well as fishing-related data and it is in the former context that the current work is being carried out.

To date, few new statistical techniques have been developed to deal with what are well documented and generally accepted phenomenon:

- a. Non-random or contagious areal and temporal distribution of both catch and effort.
- b. Continuously changing efficiencies of effort due to many physical and human factors.

Current work is based on the observation that the variance of the number of individuals per sample is most often related to the mean by the expression $S^2 = \bar{x} + \bar{x}^2/k$ and that for random sampling, k is an intrinsic property of the population being sampled and subject only to sampling variation. The mean $\bar{x}$, however even in the random case, depends on such factors as mouth opening, mesh size, duration and speed of tow, amount of incident light, etc.

It is hoped that this kind of approach which distinguishes biological from other types of variability will 1) lead to meaningful indices of patchiness or contagion, 2) evidence the relative importance of environmental and other physical and behavioral variables on the sampling process, 3) make possible a more reasonable evaluation of sampling accuracy and efficiency, 4) provide more realistic estimates of biomass variability, 5) provide a base for examining the more difficult problem of obviously non-random effort, and 6) provide some theoretical feedback from the analysis to the collection process.

The separation of biological and technical variability requires 1) raw or unstandardized numbers, 2) measurements on all variables known or suspected to have a significant effect on mean catch, and 3) a theoretical or empirical relationship describing the effect of each variable on the mean catch.

Work to date has made clear the need for creating complete data files, i.e., including all measured variables in order to facilitate this type of analysis.

STOCK AND RECRUITMENT PROGRAM

Progress Reported in Development of Histological
Criteria for Identification of Starvation
in Larvae

Significant progress was made this month in the development of histological criteria for identification of starvation in larval anchovy and jack mackerel. These studies are of major importance because they will make it possible to identify starving larvae in the sea, and thereby evaluate starvation as a cause of larval mortality.

A manuscript describing the effects of food deprivation on the histology of early post yolk sac anchovy larvae by Dr. Charles O'Connell, Fishery Biologist at the La Jolla Laboratory, was completed this month. Eleven histological features were each graded on scales of poor to good, depending variously on the texture, shape and fullness of nuclei, cytoplasm, extracellular substance, and cellular products and stores. The distribution of grades paralleled trends in survival data from this and other laboratory studies of the anchovy, demonstrating that conditions can be evaluated from histological parameters, which are largely independent of age and length over the range studied.

The order of importance of the histological features was estimated by a stepwise discriminant analysis. All 11 histological features were significant indicators of condition, but those that best classified larvae as severely (irreversibly) emaciated, conditionally emaciated, or robust were pancreas condition, trunk muscle fiber separation, notochord shrinkage, and liver cytoplasm. The discriminant analysis indicated that a larva should be evaluated on the basis of three or four features to insure a high percentage of correct classification. It was suggested, also, that average scores based on grades for several histological features could be used as estimates of relative survival potential for sea-caught larvae. The three classes mentioned above were defined on the basis of score distribution such that specimens classed as conditionally emaciated, for example, would have relative survival potentials between 33 and 66%, depending on their individual scores.

This month, Ms. Gail Theilacker, Fishery Biologist at the La Jolla Laboratory, initiated a study of the general anatomy of yolk sac and feeding jack mackerel larvae. The "normal" cellular arrangement of the individual tissues is being determined in order to be able to recognize whether there are histological changes in the tissues of starved larvae. Several preliminary histological criteria for starvation have been established. As an example, there are subtle differences in the cellular architecture of the pancreas between fed and starved 9-day-old laboratory reared larvae. (Larvae begin to feed on day 6.) The pancreatic

acinar cells of the starved larvae are not as well defined as the fed group, and the nuclei are not distinct. The tissue appears granular and may also have cellular inclusions. The consistency of these criteria between individuals of the same age, feeding and temperature regime will be determined later.

The preparation of the laboratory-reared jack mackerel larvae for histological examination (embedding in paraffin, sectioning, and staining) was nearly completed this month.

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A manuscript on "The accumulation of chlorinated hydrocarbons in a laboratory simulation of the three trophic level marine food chain" by Dr. Edward Scura and Ms. Gail Theilacker was completed this month.

Comprehensive Review of Literature on Predation
of Fish Eggs and Larvae by Planktonic
Predators Completed

Dr. A. Alvariño, Fishery Biologist at the La Jolla Laboratory, completed the first draft of a manuscript entitled "Predation in the plankton realm and fisheries." This manuscript is a comprehensive review of the literature on predation of fish eggs and larvae by planktonic predators. Chapters on Medusae, Chondrophorae, Siphonophorae, Ctenophora, Chaetognatha, and other zooplankters (copepoda, amphipoda, crustacea, polychaeta, and cephopoda) are included. Food habits have been recorded for 34 of the 800 species of Medusae, 10 of the 140 species of Siphonophorae, 12 species of Ctenophora, and 52 species of Chaetognatha. All of the species whose food habits are known feed on larval fishes. Studies of planktonic predators in the California Current suggests that the abundance of larvae may be inversely correlated with the abundance of these planktonic predators. Evidence from the literature survey indicates that there may be a relation between failure of year classes of fishes and the abundance of planktonic predators.

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Dr. V. R. Nair, Biologist from the Oceanographic Institute of India, a recipient of a UNESCO Fellowship to work with Dr. Alvariño, is currently studying the Chaetognatha of the Indian Ocean from collections taken during the International Indian Ocean Expeditions. These studies will provide valuable information on the three-dimensional distribution of various species of Chaetongatha in the Indian Ocean, and on the fluctuations of these populations in relation to changes in oceanic conditions. This information will be related to fishery data.

Study Begun of Daily Growth Rings in Otoliths of Anchovy Larvae

Mr. David Kramer, Fishery Biologist at the La Jolla Laboratory, has begun a study of the daily growth rings in the otoliths of anchovy larvae collected in December 1975 in the Los Angeles Bight in special tows using the standard 1-m CalCOFI net and the Neuston net. These samples will be used to begin a study of the relation between size of larvae and age. Completion of this work will make possible accurate estimations of larval mortality for 20 years of historical data. No small larvae, indicating new spawning, were found in the area. Of particular interest, in the few samples sorted thus far, is that both the 1-m and Neuston nets collected only "large" larvae - average length 11 mm; range, 8.5 to 15 mm.

Reading the small otoliths under high power magnification (500 to 700 X) with unfiltered light is a rather difficult task. Most otoliths are not easily read. Mr. Kramer, with the advice and assistance of Dr. David Bukry of the Geological Survey, SWFC, found that polarized light (in a petrographic microscope) changed a difficult task into a relatively easy one. The use of polarized light has resulted in more accurate counts for all otoliths, even those that might otherwise have been discarded as "too poor to read".

Experiments in Progress on Predation by Adult Anchovy on Their Young

Dr. J. Hunter reports that experiments on the predation of adult anchovy on their young was begun this month. The object of these initial experiments was to determine the digestion (elimination) rate of anchovy fed their own eggs and yolk-sac larvae, and to determine the mode of feeding used by the fish when feeding on these prey. This information is essential for evaluating the extent of cannibalism by examination of the stomachs of field-caught adults.

The mode of feeding differed: anchovy fed by filtering when eggs were present and by biting when fed yolk-sac larvae. The digestion rate of anchovy fed eggs had the exponential form typical of that of fishes in general, but the rate of digestion at 15° was much more rapid than expected. The longest period of time that eggs could be identified in the stomachs was 4 hours after feeding and, in field work, it seems doubtful that identification could be certain in 4 hours. Although data on yolk-sac larvae have not been completely analyzed, it appears that yolk-sac larvae are digested at an even more rapid rate, identification not being possible 2 hours after feeding.

ECOLOGY OF THE CALIFORNIA CURRENT PROGRAM

Subcommittee on Acoustic Surveys Recommends Development Procedure for Rapid Population Assessments of Northern Anchovy During the Growth of the Mexican Fishery on the Central Stock

The INP/CalCOFI subcommittee on acoustic surveys which met recently at the SWFC recommended that the first step in the development of population assessments of the northern anchovy should be 3 years of regional biomass estimates of schooled fish targets by stable techniques which now exist. Items to be reported are 1) the proportion of the area sampled, 2) the proportion of the sampled area having fish schools, and 3) an estimate of the biomass of fish per unit school area. These will be combined for regional estimates of schooled fish biomass. Trawl samples will be taken in selected fish concentrations to establish the identity and age composition of the trawlable fish in the region. All potential regions for the anchovy should be surveyed annually during this development period and all regions in which anchovy fishing is being conducted should be surveyed quarterly during the initial phase. The subcommittee, which consists of at least one representative from the California Department of Fish and Game (Ken Mais), Mexico's Instituto Nacional de Pesca (Jacobo Melcer), and the La Jolla Laboratory of the Southwest Fisheries Center (Paul Smith) also recommended that a limited program of practical and fundamental acoustic research be conducted at the same time as the standard surveys and that improvements which are warranted should be incorporated in the standard surveys after 3 years, to allow collection of statistical data with stable technical properties over extended periods.

The primary motivation for the rapid survey technique with sonar mapping has been the 20-fold changes in the central subpopulation of anchovy in a 16-year period. The rapidity of this change in the virtual absence of a significant fishery places emphasis on the need for interim estimates between spawning surveys. The currently projected catch for this stock is about 630,000 tons. The minimum stock size estimate for the central subpopulation of the northern anchovy in the absence of a fishery was about 267,000 tons in 1951.

The next subcommittee meeting is planned for Mexico City in late February. Among the topics for that meeting are 1) the documentation of the performance characteristics of the acoustic equipment on the NOAA vessel David Starr Jordan, the Department of Fish and Game vessel Alaska and the INP vessel Alejandro Humboldt, 2) the tactical design of the fishing region surveys and the anchovy population surveys, 3) research plans for quantitative description of the depth distribution of anchovy schools and their thickness in the vertical plane, 4) research plans for describing the age structure of anchovy sonar targets for comparison to regional spawning biomass estimates, and 5) other selected topics of mutual interest. The minutes of the previous meetings of the Subcommittee on Acoustic

Surveys are available from Ms. K. Coleman, NMFS, Southwest Fisheries Center, P.O. Box 271, La Jolla, California 92038.

Information on Hake Larva Distribution
and Abundance Used in Renegotiation
of U.S.-Polish Bilateral Agreement

In an Administrative Report, (LJ-75-83, November 1975) authored by Dr. Paul E. Smith, it was pointed out that the hake population had apparently reacted to the fishery conducted on this species over the past 10 years by Soviet and more recently by Polish trawlers. The primary effect noted was a curtailment in spawning on the southern half of the spawning grounds. Until 1965, half of all hake larvae were found north of Ensenada, Baja California, Mexico. After 1965, this proportion declined to less than 5% of the total larvae found. This phenomenon is reminiscent of the shrinking of the feeding grounds and spawning areas of the Pacific sardine prior to the rapid decline of the total stock. Important changes in the population of hake have thus been sensed by the spawning surveys and indicate that additional caution should be exercised in the management of the hake fishery.

This information has been used for renegotiation of the U.S.-Polish bilateral agreement on fisheries by which the present Polish hake catch quota has been reduced by 39%.

MARINE ENVIRONMENTAL ASSESSMENT PROGRAM

Attempts Continue to Rear Rockfish Larvae

The peak period of the rockfish (Sebastes) reproduction season is December and January. Dr. Elbert Ahlstrom, Senior Scientist and leader of the Marine Environmental Assessment Program reports that efforts are being made to rear larvae collected from pregnant females. Larvae of two species, S. gilli and S. rufus, which were previously unknown, were reared to the point of yolk exhaustion but did not feed. Drawings of the larvae of these two species will be included in the scorpionfish identification guide. Previous failures to raise rockfish larvae appear to be related to container size and configurations, and Dr. Geoff Moser is collaborating with Dr. John Hunter and Mr. Dennis Gruber, Biological Technician, to correct this.

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Ms. Barbara Wolf and Mr. Leonard Eysymont, from the Sorting Center in Szczecin, Poland, left the La Jolla Laboratory on December 8 and 9, respectively after a month's stay but work is continuing on collating meristics of adults and illustrations of larvae of species found in the northwestern Atlantic collections for the use of the Sorting Center.

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Dr. Ahlstrom reports that comments have been received for a manuscript authored by Moser, Ahlstrom and O'Toole dealing with "Description of the larvae and early juveniles of the commercial lanternfish Lampanyctodes hectoris (Günther) off the west coast of Southern Africa." The manuscript, after clarification of points raised by reviewers, was submitted to the Editor of a Special Issue of the Proceedings of the Southern California Academy of Sciences honoring Dr. Carl Hubbs, Professor-Emeritus of Biology, University of California, San Diego, and world-famed ichthyologist.

Two reviews have also been received to date on the multi-authored (Ahlstrom, Butler and Sumida) paper dealing with the life histories of pelagic stromateoid fishes in the eastern Pacific. According to Dr. Ahlstrom, both reviewers were thorough and helpful and their comments improved the long paper which in its present form exceeds 240 typed pages.

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Three New Recoveries of Black Marlin Reported In Cooperative Marine Gamefish Tagging Program

Three new recoveries of black marlin tagged off Australia were reported by Japanese authorities to Mr. J. L. Squire, Jr., Fishery Biologist at the La Jolla Laboratory. The fish were recovered after being tagged approximately 1 year previous, in about the same area of tagging, which was near Cairns, North Queensland, Australia. This brings the total of black marlin tag recoveries for 1975 to seven.

New marlin and albacore tag return posters were distributed by the SWFC during the past month. These posters are printed in Japanese and Korean and, according to Mr. Squire who supervises the Cooperative Tagging Program in the Pacific, should be helpful in obtaining billfish and albacore tags recovered aboard Japanese and Korean longline fishing vessels. The posters indicate collection points for tags within the two countries, thereby providing an easier method for the fisherman to return the tag, rather than having to send it overseas directly to the SWFC.

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Mr. Squire, who is in charge of the pelagic fish monitoring program off Southern California, reports this month that all flight logs have been received for the 1975 season. As expressed in numbers of flight logs, the amount of effort expended on these flights is greater than in 1974. Mr. Squire and staff will analyze these logs for indications of trend in the apparent abundance of the northern anchovy, Pacific and jack mackerels, and Pacific bonito.

Mr. John Bourgois, an aerial spotter in the NMFS program for several past years is now flying out of Baja California, and his contract with NMFS has been terminated. As a replacement, a contract was written to Mr. Charles Rogers of Ventura who has been spotting for bonito, mackerel, and anchovy fisheries for a number of years. His efforts will bring the number of contract pilots working off southern California to six.

Through agreement with one of the aerial spotters, photographs of anchovy school profiles were taken during fishing operations, for a study to determine the school area-tonnage relationship. In addition, 40 aerial photographs of anchovy schools taken during the day with color film, and at night from a low light level television monitor (courtesy of Zapata Remote Sensing, Inc.), were analyzed for horizontal school area length-width proportions. This information is needed for evaluation of aerial and sonar techniques of stock assessment.

Oceanic Fisheries Resources Division

TUNA RESOURCES PROGRAM

New Approach on Continuing Study of Relationships Between Fishing Success and Environmental Parameters

As part of a project to study relationships between fishing success and environmental parameters in the eastern tropical Pacific tuna fishery, Meteorologist N. Clark and Mathematical Technician K. Brennecke of the La Jolla Laboratory prepared three time sequences of data for the first 4 months of each year in the 1971-74 period. Each of the time sequences represents a data sample from a 5° latitude-longitude quadrangle in the tuna fishery off Central and South America.

This approach differs from previous work in that it is focused on time changes in the fishery and environment for a particular area rather than a spatial variation for a particular time period of a month or season.

Preliminary analysis of the statistical results indicate that catch-per-set, mean set size, and successful set probability for non-porpoise sets are significantly correlated with the temperature gradient in the thermocline in each of the 5° areas. Further analysis is in progress using porpoise sets and a fishery parameter of total catch per boat-day.

Manuscripts on Atlantic Tunas in Preparation

Fishery Biologist Dr. Gary Sakagawa, at the La Jolla Laboratory, reports that outside reviews of a manuscript on "Length composition of yellowfin, skipjack and bigeye tunas caught in the eastern tropical Atlantic by American purse seiners" by G. Sakagawa, A. Coan and E. Holzapfel were received, and a final draft of the manuscript prepared. The manuscript is currently being processed for approval as a publication.

Work began during December on assembling information for a report on the fishery for yellowfin tuna in the Atlantic Ocean. Current plans call for the report to include information on the Atlantic-wide fishery, which caught about 110,000 MT in 1974. This catch is close to present estimates of maximum sustainable average yield for the stocks.

U.S. Purse Seine Catch of Atlantic Tropical Tunas Monitored by La Jolla Laboratory

Since 1967, U.S. purse seiners have annually participated in the eastern tropical Atlantic tuna fishery. In 1975 the fleet fished during January-February and again during June-December. Ten U.S. seiners fished there during January-February and caught approximately 3,200 MT of yellowfin and skipjack tuna. During June-December, 29 U.S. seiners fished in the eastern tropical Atlantic and caught an estimated 18,200 MT of tuna. Preliminary data suggest that the bulk of this catch is yellowfin tuna.

Length-frequency samples were collected by personnel of the Inter-American Tropical Tuna Commission, under contract arrangements with the National Marine Fisheries Service, from the catch of the U.S. seiners. More than 80 samples from 21 vessels have so far been collected. The approximate catch sampled and number of samples taken by species are as follows:

<u>Species</u>	<u>Approximate tonnage sampled</u>	<u>Number of samples (approximately 50 fish/sample)</u>
Yellowfin	2,250	47
Skipjack	1,000	28
Little tunny	20	3
Bluefin	40	1
Bigeye	20	1
Other	20	1
Total	3,350	81

Mathematician Al Coan at the La Jolla Laboratory reports that the data collected from the fleet are being processed for analysis.

Atlantic-Caught Tunas by Foreign Vessels
Sampled in Puerto Rico

Landings of Atlantic-caught tunas by foreign vessels are sampled in Puerto Rico by Biological Technician Eugene Holzapfel of the La Jolla Laboratory. So far this year, 4,742 fish were sampled for length measurement and species identification. The number of fish sampled by species are:

<u>Species</u>	<u>Tonnage sampled (metric tons)</u>	<u>Number of fish sampled</u>
Albacore	3,444	543
Bigeye	129	105
Skipjack	3,846	1,453
Yellowfin	1,992	2,641
Total	9,411	4,742

About 60 species identification samples, containing approximately 50 fish each, were taken during March to December. Samples taken from the labeled yellowfin tuna landings indicate that 1 to 16% of the landings are actually bigeye tuna.

National Weather Service Sponsors Year-End
FAX Meeting with Tuna Fishermen

Dr. Daniel Huppert, Economist and Mr. Richard Evans, Oceanographer of the La Jolla Laboratory participated in National Weather Service-sponsored meetings with purse seine skippers and navigators on December 11 and 12 at Portuguese Hall in San Diego. Bob Baum of the NWS delivered a presentation on the progress of the tropical Pacific weather services produced by the Redwood City, California forecast office. Also, recent developments in satellite weather monitoring were demonstrated by showing a 16-mm film made from satellite pictures taken every 30 minutes. The period, April-October 1975 was depicted. Major frontal systems and tropical storm developments were clearly visible.

NMFS personnel presented a summary of 1975 FAX program participation, and reviewed the work that the Southwest Fisheries Center has done in characterizing the ocean and weather factors associated with good purse seine fishing. Fishermen were given an opportunity to comment upon existing FAX products, and to suggest new or altered products.

The small number of fishermen attending the meetings did not constitute an adequate sample of opinion, but the general feelings of the fishermen seemed to be that the weather charts received through the FAX system were extremely valuable and that the oceanographic charts produced at the Center were used judiciously by some and not at all by others. In addition, a view which was strongly vocalized was that the

more successful tuna fishermen did not want NMFS to broadcast fishery advisory charts which could give less skillful, or less lucky, fishermen an opportunity to catch more fish.

FAX Program Receives Record Number of Observations in 1975

Oceanographer Dick Evans reports that the staff of the Real-Time Fishery Systems program at the La Jolla Laboratory received 2,839 weather reports and 546 expendable bathythermograph reports from the eastern tropical Pacific in 1975. These reports were radioed to the La Jolla Laboratory through radio station WWD from some 77 tuna purse seiners participating in the laboratory's Cooperative Facsimile program.

Since the beginning of the program in 1971 some 13,655 weather and XBT observations have been received at the laboratory by radio. The 3,385 observations received at the laboratory in 1975 represent a 7.3% increase over the previous best year, 1973, when 3,149 observations were received and a 14.6% increase over 1974 which had 2,950 observations.

According to Mr. Evans, the increase in the reporting rate can be attributed to diligent liaison work by the staff of the program and an increased number of cooperating vessels.

TUNA/PORPOISE PROGRAM

Two NOAA Research Vessels Assigned to Porpoise Survey in Eastern Tropical Pacific

Dr. William Lenarz, Leader of the Tuna/Porpoise program reported that intensive preparations continued in December for the porpoise boundary cruise which will involve two NOAA research vessels, the David Starr Jordan, detailed to the La Jolla Laboratory, and the Townsend Cromwell, assigned to the Honolulu Laboratory. According to Dr. Lenarz, the primary purpose of this survey is to ascertain the boundaries of offshore porpoise distributions in the eastern tropical Pacific, particularly that of the spotted and spinner porpoise species, the principal species involved in the tuna fishery. The survey is also designed to investigate the distributions in regions of presently understood boundaries along divergence and convergence regions of the equatorial currents, and near oceanic islands. The joint ship survey may be supplemented by aerial coverage over coastal waters by land-based aircraft. Chief scientist aboard the Cromwell is Dr. David Au while Dr. Eric Barham

is the scientific leader aboard the Jordan. Both ships are scheduled to return to San Diego on March 3.

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Lt. Wayne Perryman, a NOAA Corps Officer, reported for duty to the La Jolla Laboratory on December 29. Lt. Perryman's first assignment was to participate in the porpoise boundary cruise aboard the NOAA research vessel, Cromwell.

NMFS Gear Research Technician to Observe Performance of Porpoise-Saving Gear Aboard Seiner

The tuna purse seiner, Bold Contender, has agreed to carry a NMFS gear research technician on the first trip of the 1976 tuna fishing season in the eastern tropical Pacific for further observations on the performance of the porpoise apron and chute and fine mesh webbing. According to Dr. William Lenarz, in charge of the Tuna/Porpoise program at the La Jolla Laboratory, these gear modifications performed extremely well in reducing incidental porpoise mortality during the NMFS gear charter cruise of the Bold Contender during the fall of 1975. The La Jolla Laboratory is also attempting to place a gear research technician aboard the purse seiner, Eastern Pacific, also a former NMFS charter vessel, which is equipped with similar gear.

TIBURON LABORATORY

COASTAL FISH COMMUNITIES INVESTIGATIONS

Analysis of Santa Catalina Recreational Fish Collection Continues

Tony Chess, Fishery Biologist at the Tiburon Laboratory, continued analyzing collections from Santa Catalina this month. These include stomach contents of recreational fishes and samples of the benthic habitats.

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Dr. Edmund Hobson, Project Leader, was on annual leave for 3 weeks during this month; nevertheless, he participated in a workshop on the Tuna-Porpoise problem, held at the University of California, Santa Cruz, December 8-9 and also attended the annual meeting of the Western Society of Naturalists, held at San Francisco on December 27 where he presented a paper entitled "Trophic relations among fishes and zooplankters."

PHYSIOLOGY INVESTIGATIONS

Physiology Manuscripts on Oil Toxicity Studies Nearing Completion

Dr. Jeanette Struhsaker, Leader of the Physiology Investigations at the Tiburon Laboratory reports considerable progress toward completion of embodying results of the recently ended oil toxicity study.

Two papers, "The uptake, distribution and depuration of ^{14}C benzene in northern anchovy (Engraulis mordax) and striped bass (Morone saxatilis)" by S. Korn, N. Hirsch and J. W. Struhsaker, and "The effects of benzene on the growth, fat content and caloric content of striped bass (Morone saxatilis)" by S. Korn, J. W. Struhsaker and P. Benville, were approved by the Center Director and have been submitted for publication.

Three more manuscripts dealing with acute toxicities of six different aromatics, benzene uptake studies in the marine rotifer, Brachionus, and the effects of aromatic hydrocarbons on Pacific herring spawners were returned from outside reviews and were submitted to the Laboratory Director for approval.

Another two papers concerned with the effects of xylene and benzene on early life stages of Pacific herring are currently being completed after their return from outside reviews.

With two more manuscripts in preparation, four already published and the above works in final phases of completion, the 3-year program will have produced 13 technical papers on the effects of monocyclic aromatic hydrocarbons on marine organisms.

Striped Bass Study Preparation Continues

Physiology Investigations staff members have been doing preparatory work for upcoming experiments on the factors affecting mortality in striped bass larvae.

Construction of algae and zooplankton rearing and larval fish testing areas is nearly finished. Chemical procedures for different aspects of the study were also completed.

Fishery Biologist Tina Echeverria and Biological Technician Jeffrey O'Neill collected phytoplankton and zooplankton organisms which are commonly found in striped bass spawning and nursery grounds. These organisms are currently being cultured in the laboratory to determine growth rates and requirements necessary for mass culture.

Final review and recommendations were completed on the conceptual model of striped bass mortality. This work is in preparation for a meeting on January 13 in which representatives of three different governmental agencies will draw up a final version of the model.

COASTAL FISHERIES INVESTIGATION

Local Fisheries Development - Sea Urchin Fishery Examined

Mr. Susumu Kato, Fishery Biologist, traveled in southern California from December 7 through December 14 to attend the CalCOFI conference in La Jolla. He also visited several sea urchin processing plants at Santa Barbara, Oxnard, Ventura, Long Beach, and Los Angeles, and attended a seminar at San Diego State University concerning the feasibility of establishing a sea urchin fishery in San Diego. In Santa Barbara Mr. Kato conferred with co-author Steven Schroeter about their manuscript on the sea urchin fishery. Mr. Kato also met with researchers at Long Beach, La Jolla, and San Diego to discuss rockfish research.

The young sea urchin fishery, which was developed by NMFS authority, has undergone cycles of boom and bust over the last 2 years. Economic conditions in Japan have severe impact on the fishery, since the primary market is in Japan.

The sea urchin fishery gained full momentum in December, with eight to nine plants often processing nearly 100,000 lbs. of urchins per day. Good prices at the Tokyo market accounted for the increased activity. Sea urchins are primarily being harvested at the northern Channel Islands, but some are also being taken from the mainland coast at San Diego. The fishery should continue at a fairly high level until early spring when increased supply provided by the Japanese fishery will depress prices.

Improved Designs for Pen Floats Obtained from Salmon Raisers

Mr. Roger Green, Fishery Biologist, reports that through personal communication with several raisers of pen-reared salmon a number of ideas were obtained for improving pen-float design to better withstand winter storms. Work started on design modifications and plans were made to modify one pen and moor it over the winter for observation.

Preparations were begun, with the Tyee Club, to obtain a new stock of fingerling coho salmon from the California Department of Fish and Game's Merced hatchery in late winter or early spring. Tentative plans for 1976 include rearing of two batches of salmon for release. Three tag returns from last month's salmon release were received.

Salmon in Spawning Condition Cited at Tiburon

Following reports of salmon in spawning color sighted alongside the sea wall at the Tiburon Laboratory, a gill net was set overnight and one of these fish was caught. This proved to be a fin-clipped male coho from the 1974 release. Fork length was 611 cm and weight 1.89 kg. The fish was in typical, upstream spawning condition with dark coloration, hooked jaws, ripe and full gonads, and empty stomach.

Anglers' Guide to the United States Pacific Coast - Type Specifications Being Prepared for Anglers' Guide

Ms. Susan Smith, Publications Specialist, spent most of December working on the type specifications for the Pacific Anglers' Guide, an upcoming NMFS publication that describes marine game fish, fishing grounds, and angler facilities all along the U.S. West Coast and around the tropical islands of Hawaii, American Samoa, and Guam. Ms. Smith completed most of the type specs and sent them to the Scientific Publications Staff in Seattle, who will be handling arrangements for the printing contract through the Seattle Government Printing Office.

The Guide is co-authored by James L. Squire, Fishery Biologist at La Jolla, and Susan Smith, Publications Specialist at Tiburon. The completed book will contain about 200 pages, including 40 coastline angling charts, and illustrated descriptions of over 200 marine game fishes.

PUBLIC RELATIONS - SOUTHWEST FISHERIES CENTER

The Southwest Fisheries Center was represented at the Comm/Fish/Mart and Work Boat Show in San Diego on December 19, 20, and 21 with a booth illustrating the mission of NMFS and the Southwest Fisheries Center. The booth, designed and built by Scientific Illustrator Ken Raymond (see illustration below) was manned during the convention by Messrs. Raymond, Dan Huppert, Nate Clark, Pete Paloma, Gary Sakagawa and Dick Evans. Mr. Dick O'Keef, of the Banner News Service, who produced the show, estimated that attendance during the 3 days was about 4,000, including commercial fishermen, vessel owners, their suppliers, and the interested public.

HONORS AND AWARDS

Dr. Brian Rothschild, Director of the Southwest Fisheries Center, was unanimously re-elected Chairman of the Standing Committee for Research

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and Statistics (SCRS) of the International Commission for the Conservation of Atlantic Tunas (ICCAT) for a second 2-year term at the annual meeting in Madrid, Spain in November 1975.

Dr. Rothschild is the second scientist and first American to occupy the post of Chairman of SCRS since the formation of ICCAT in 1969. The chairmanship of SCRS is a critical position for the conservation of Atlantic tuna resources since it is this group which analyzes and advises the Commission on the status of tuna fish populations with regard to levels of fishing, and makes recommendations based on scientific findings on the need for measures to conserve the resource.

The ICCAT, headquartered in Madrid, has the responsibility for the conservation of tuna and tuna-like fish resources in the Atlantic Ocean. The U.S. is one of 13 Atlantic tuna fishing countries represented in the Commission.

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One of the highest compliments which can be paid to a scientist is to have his name given to a newly discovered species. This rare honor was recently conferred on Dr. E. H. Ahlstrom, Senior Scientist at the La Jolla Laboratory when Robert K. Johnson and Garrett S. Glodek writing in the December 1975 issue of Copeia, the official publication of the American Society of Ichthyology and Herpetology, described two new species of Evermannella from the Pacific.

Concerning one of these fish the authors wrote, "Evermannella ahlstromi is named for Dr. E. H. Ahlstrom in recognition of his many contributions to the study of pelagic fishes and pelagic fish larvae, particularly from the eastern Pacific area." Several specimens of E. ahlstromi were collected from the NOAA research vessels, David Starr Jordan and Townsend Cromwell. Its distribution is limited to the eastern Pacific where it occurs in the southern transition region of the North Pacific and in portions of Pacific equatorial water.

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MEETINGS AND TRAVEL

December 1 - 3 - National Academy of Science Team Reviews Southwest Fisheries Center R&D Program

Headed by Dr. Scott Overton, Oregon State University, a panel of the National Academy of Science/National Academy of Engineering reviewed the programs of the

Southwest Fisheries Center, December 1 to 3 as part of the NOAA-contracted independent review of the quality of its R&D activities. Prior to the actual review, the members of the panel were provided with a considerable amount of briefing material. Panel members asked selected members of the scientific staff for their suggestions on improving the opportunities for preparing scientific publications, sabbatical assignments, attendance at workshops, etc. They were also interested in opportunities for interaction with the scientific community, attendance at scientific meetings, training, editorial policies, scientist-administration interactions, and on-going cooperative research projects with individuals and institutions. The consensus of the staff at the Center was that the review was a worthwhile and interesting experience.

In addition, to Dr. Overton, other members of the panel were Dr. Peter Colby of the Ontario Ministry of Natural Resources, Dr. Ferris Webster, Woods Hole Oceanographic Institution, Dr. Frank Williams, University of Miami, Dr. William Young, New York State College of Agriculture and Life Sciences, and Mr. Richard Vetter, Ocean Affairs Board/Ocean Science Committee of the National Academy of Sciences. Subsequently, Drs. Colby and Young, traveled to Tiburon, California to conduct a review there, while Drs. Webster, Williams and Mr. Vetter visited the Honolulu Laboratory to interview the scientific and technical staff.

- December 1 - 6 - Dr. William Perrin, Leader of Porpoise Biological Studies and field operations at the La Jolla Laboratory, attended a meeting of the Ad Hoc Consultants Group IV (Systems Analysis), ACMRR Working party on Marine Mammals in Monaco. Purposes of the meeting were to complete a preliminary review of systems analysis aspects of marine mammal ecology and conservation, and to act as a steering committee for the ACMRR Conference on "Conservation of Marine Mammals" to be held in Bergen, Norway, August 31 - September 9, 1976.
- December 4 - The NAS review team, made up of Dr. Ferris Webster, Dr. Frank Williams, and Mr. Richard Vetter, visited the Honolulu Laboratory where they interviewed scientific and technical staff members.
- Mr. Shomura accompanied RADM H. R. Lippold, Director, PMC, and CDR Merritt N. Walter, CO, Townsend Cromwell, on a courtesy call to Governor Ariyoshi.

- December 7 - 14 - Mr. Susumu Kato of the Tiburon Laboratory attended the CalCOFI Conference in La Jolla, California.
- December 8 - 9 - Dr. Edmund Hobson traveled to Santa Cruz, California to participate in the Tuna-Porpoise Conference.
- December 8 - 11 - Center Director Attends IPFC Meetings in Bangkok.

Center Director Rothschild attended a meeting of the Indo-Pacific Fisheries Council Ad Hoc Committee to review the functions and responsibilities of the IPFC in Bangkok, Thailand, December 8-11. In a trip report filed on his return, Dr. Rothschild noted that the terms of reference of the Ad Hoc Committee basically involved a review of the achievements and limitations of IPFC during the past 25 years, a redefinition of functions and responsibilities of IPFC as a result of the review, and a modification of the IPFC agreement and rules of procedure as required by the redefinition of the functions of the responsibilities. One of the important actions taken at this meeting was a recommendation that IPFC should have a Standing Committee on Research and Statistics which would provide scientific advice either on its own initiative or at the request of member countries.

Following the above meeting the Indian Ocean Fisheries Committee Ad Hoc Committee on the Mechanics of Tuna Research and Management met December 12-13, also in Bangkok. The key decision or recommendation of this meeting was that IPFC/IOFC should develop a standing Committee on research and statistics (SCRS), which would then develop a subcommittee on tuna assessment.

The recommendation that IPFC/IOFC set up a SCRS, would, according to Dr. Rothschild, do much to systematize the monitoring of tuna stocks in the Indo-Pacific. The development of a prospectus on a program involving management will serve to bring into focus the costs and benefits of such a program so that the individual countries could better appreciate these and thus be able to enter into the support of an integrated program.

Dr. Rothschild further noted that the U.S. needs to monitor carefully and participate in the development of tuna management activities in the Indian Ocean, owing to the longer range interests of the U.S. tuna fleet and the nearer term interest of U.S. processing operations.

- December 8 - 11 - Mr. Norman Abramson, Director of the Tiburon Laboratory, traveled to Washington, D.C. to work on the Marine Recreational Program Development Plan.
- 10 - 12 - A 3-day North Pacific Albacore Population Dynamics Workshop, chaired by Dr. Wetherall, was convened at the Honolulu Laboratory.
- 15 - 18 - Mr. Shomura convened and chaired the FAO Ad Hoc Committee to Review Biology and Status of Stocks of Small Tunas (also called the Small Tunas Workshop). Participants included Mr. A. Fonteneau, ORSTOM, Abidjan, Ivory Coast; Dr. Robert E. Kearney, SPC, Noumea, New Caledonia; Dr. Shoji Kikawa, Far Seas Fisheries Research Laboratory, Shimizu, Japan; Mr. W. L. Klawe, IATTC, La Jolla, California; Dr. Peter M. Miyake, ICCAT, Madrid, Spain; Mr. Alex Rawung, Marine Fisheries Research Institute, Jakarta, Indonesia; Dr. K. Sivasubramanian, UNDP, Sri Lanka; Mr. Jacobus C. B. Uktolseja, Marine Fisheries Research Institute, Jakarta, Indonesia; Dr. Aurora Chirinos de Vildoso, Instituto del Mar, Lima, Peru; Mr. Minato Yasui, Graduate Student, Tokai University, and 1-year visiting scientist at the Honolulu Laboratory; Mr. Shomura, Mr. Walter M. Matsumoto, Dr. Robert A. Skillman, Mr. Richard N. Uchida, and Mr. Howard O. Yoshida, all of the Honolulu Laboratory.
- 27 - Dr. Hobson attended the annual meeting of the Western Society of Naturalists, San Francisco, CA.

VISITORS

Honolulu Laboratory

- December 1 - Dave Brown, Coos Bay, Oregon.
- 2 - Dr. Keishi Shibata, Faculty of Fisheries, Nagasaki University, Japan.
- 4 - James Brooker, Fishery Products and Safety Division, Washington, D.C.
- 5 - Dr. Brian J. Rothschild, Director, SWFC, La Jolla.
- 9 - Ron Noland, University of Hawaii, Hilo Campus.
- 29 - Roy Mendohlsson, Yale University, New Haven, Connecticut.

La Jolla Laboratory

- December 2 - Dr. Vladimir Cooksa, P. P. Shirshov Institute of Oceanography, Academy of Sciences, Moscow.
- 3 - Mr. Charles Burans, Department of Marine Resources of South Carolina, Charleston, South Carolina.
- 3 - Messrs. Andrew Vrooman, James Meehan and Willis Glidden, NMFS, Washington, D.C. - MARMAP Survey 3 Meeting Acoustics Workshop.
- 8 - Messrs. John Everett and Davis Hays, NMFS, Washington, D.C.
- 8 - Mr. Herbert Hyatt, BLM Pacific, OESO Office, Los Angeles, California.
- 8 - Dr. Francis Monastero, U.S. Department of Interior, Washington, D.C.
- 8 - Mr. Donald Keene, Bureau of Land Management, Los Angeles, California.
- 15 - Mr. J. Breiwick, under contract to the Marine Mammal Commission to discuss data needs of the Commission in terms of the porpoise program.

Tiburon Laboratory

- December 4 - Bob Tasto, California Department of Fish and Game, Menlo Park, California.
- 4 - Dr. Peter Colby and Dr. William Youngs, National Academy of Sciences, Washington, D.C.
- 12 - Richard M. Sitts, University of California at Davis, Davis, California.
- 18 - Tim Newcomb, NWFS, Seattle, Washington.
- 22 - Mike Aceituno, BLM, Pacific OCS, Los Angeles, California.
- 24 - Robert Brown, Frank Corbelli, and J. F. Lestanguet, Tyee Club, San Francisco, California.

PERSONNEL

Laboratory

- December 9 - Thomas Byles, Biological Aid (Fisheries), Honolulu
career conditional appointment.
- 15 - Kenneth LeVeille, Biological Technician, La Jolla
expiration of appointment.
- 15 - Jonathan Halas, Biological Technician, La Jolla
expiration of appointment.
- 15 - William Flerx, Biological Technician, La Jolla
expiration of appointment.
- 19 - Michael Fitzsimmons, Biological Technician, La Jolla
resignation.
- 28 - Charles Oliver, Computer Specialist, La Jolla
Pay adjustment to full time.
- 29 - James Lambert, Biological Technician, La Jolla
temporary appointment; Rodney McLain,
Biological Technician, temporary appointment; Thomas Shag, Biological Technician,
temporary appointment; Philip Unitt,
Biological Aid, temporary appointment;
Gary Friedrichson, Biological Technician,
temporary appointment; William Walker,
Biological Technician, temporary appointment;
Robert Pitman, Biological Aid, temporary appointment.
- 31 - Charles Kokes, Biological Technician, La Jolla
extension of temporary appointment.
- 31 - Jon Decosin, Biological Aid, termination Honolulu
of temporary appointment.